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Service manual
Precision balance

KERN PFB

Version 1.0
1/2010
GB







PFB-SH-e-1010

GB

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Service manual

Precision balance

Table of Contents

1 Basic information
Grundlegende Hinweise

The device must be repaired only by trained specialist staff or personnel with professional formation (such as a repair-specialist accredited by law concerning verification).

The service manual is obligatory for repair work.

After repair, original conditions of the device have to be restored.

Only original spare parts should be used.

Das Gerät darf nur von geschultem oder beruflich ausgebildetem Fachpersonal (z. B. eichrechtlich anerkannter Instandsetzer) repariert werden.

Die Serviceanleitung ist bindend für Reparaturen.

Das Gerät muss nach erfolgter Reparatur wieder in den Originalzustand zurückversetzt werden.

Es dürfen nur Originalersatzteile verwendet werden.

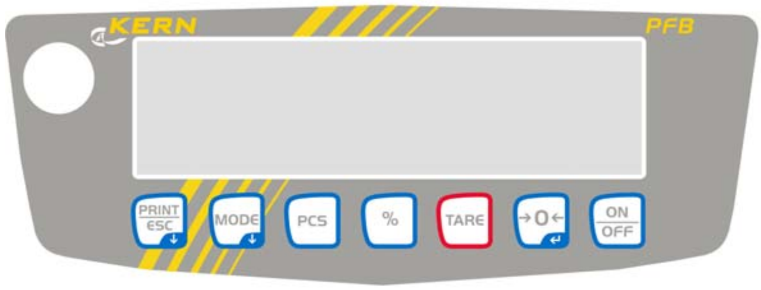
2 Transportation lock

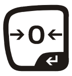
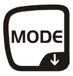
The balance must be installed in a way that the weighing plate is exactly in horizontal position.

Remove the transportation lock [1] (PFB 120-3, PFB 200-3, PFB 1200-2, PFB 2000-2):



3 Keyboard description



Key	Designation	Pressed once and released
	**[ON/OFF]**	⇨ Turn on/off
	**[ZERO]**	⇨ Set weight display at zero ⇨ Activate the current element in the menu ⇨ Select in Weighing units (menu F UNIT): change to the next unit
	**[TARE]**	⇨ Taring
	**[%]**	⇨ Call-up %-function ⇨ In the percent mode back to weighing mode ⇨ Only % function
	**[PCS]**	⇨ Call-up piece counting mode ⇨ In the piece count mode back to weighing mode
	**[MODE]**	⇨ Weighing units switch-over; ⇨ At weighing unit switch-over (menu „F UNIT“): Set weighing unit on/off ⇨ Counting up in piece counting mode ⇨ Select menu and pass through menu items from top to bottom ⇨ Changing readability
	**[PRINT/ESC]**	⇨ Print out weighing result ⇨ Exit menu (jumping back to weighing mode)

4 Battery operation

The balance come with a rechargeable battery, can be operated from the battery if desired. The battery life is approximately 40 hours.

There is a battery symbol on display used to indicator battery status

Flick: charging battery

Full: battery full or charge finished

Half: battery with half power

Blank: need be charged

When battery symbol become blank, please change battery or use AC adapter, the scale does not need to be turned on. The battery should be charged for 12 hours for full capacity.

As the battery is used it may fail to hold a full charge.

Note: new batteries are shipped partially charged. Before you can use your scale, you need to charge the battery, as indicated by the following instructions.
Some batteries perform best after several full charge/discharge cycles.
Battery performance depends on many factors, including your backlight setting and operate.

WARNING

Never use any charger or battery which is damaged.
Do not short-circuit the battery. Accidental short-circuiting can occur when a metallic object (coin, clip or pen) causes direct connection of the + and - terminals of the battery (metal strips on the battery).
Do not dispose of batteries in a fire
Dispose of batteries according to local regulations (e.g. recycling). Do not dispose as household waste.
Avoid charging under airless conditions

To maximize your battery's performance:

- Always use original batteries and AC adapter. The scale warranty does not cover damage caused from using non original batteries and/or battery chargers.
- New batteries or batteries that have been stored for long periods of time may require a longer charge time.
- Maintain the battery at or near room temperature when charging.
- Do not expose batteries to temperatures below -10°C (14°F) or above 45°C (113°F).
- Over extended periods of time, batteries gradually wear down and require longer charging times.

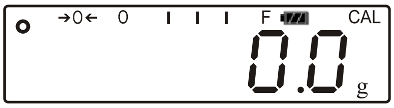
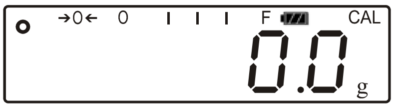
This is normal. If you charge your battery regularly and notice a decrease in operate time or an increase in charging time, then it is probably time to purchase a new battery.

5 Calibration

Observe stable environmental conditions.

A warming up time of approx. 2 hours is required for stabilization.

Ensure that there are no objects on the weighing plate.

Balance display	Operation
 	⇨ In weighing mode press  approx. 3 sec. until „**UnLoAd**“ appears.
	When display „**LoAd**“ appears, put the necessary calibration weight on the center of the weighing plate. PFB 120-3: 100g (F1) PFB 200-3: 200g (F1) PFB 1200-2: 1000g (F1) PFB 2000-2: 2000g (F1) PFB 6K0.05: 5000g (F1) PFB 6000-1: 5000g (F1) Calibration will be carried out automatically after dead stop control.
	⇨ Wait for stability display
	„**Pass**“ appears, the calibration process has been finished successfully. ⇨ Take away calibration weight
	Wait until the balance is again in the weighing mode.

6 Parameter setting (incl. linearity adjustment)

The scale has 9 parameters (include 6 technical parameter) plus a method of entering the calibration section.

The menu is called-up by pressing the MODE key during self test.

The display appears the first parameter "F1 UNt".

6.1 Navigation in the menu

Key	Direction in the menu	Description
MODE	↓	Select menu and pass through menu items from top to bottom
→0←	→	Select current element
PRINT ESC	↑	Exit the current element, return to weighing mode

Note: When display shows "**tECH**", press →0← key to enter. Display shows "**Pin**".

Press PCS, then PRINT ESC and finally TARE key to enter technical parameter setting mode.

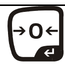
The display appears "**P1 Lin**". With the MODE key you can select the desired parameter.

6.2 Parameter table

FUNCTION	DESCRIPTION
F1 Unt	Selection of weighing units ct / lb / oz / d / gn / ozt / dwt / mom / tl.T / tl.c / tl.t / t / bt / n
F2 bL	Backlight on/automatic/off EL on: backlight always on EL AU: backlight switches on automatically EL oFF: backlight always off
F3 Con	RS-232-interface (ASCII code, 8 data bits, no parity) Select RS-232 or USB (not used): S 232: RS-232 interface S USB: USB interface (not used) Select communication mode: P Prt: data output via Print-key (After each weighing unload the pan) P Cont: continuous data output P AUto: autom. Printout (After the stability marks appears, there is a beep. Remove the weight immediately. The automatic printout – number + weighing value – starts.) WirELE: wireless (not used) Select interface settings: b xxx: baud rate 600/ 1200/ 2400/ 4800/ 9600bps tP or LP-50: tP: normal printer / LP-50: label printer (not used)
tECH	Pin: Press PCS, then PRINT ESC and finally TARE key to enter technical parameter setting mode. The display appears "**P1 Lin**". With the MODE key you can select the desired parameter.
P1 Lin	Linearity adjustment: Pin: Press PRINT ESC, then PCS and finally % key. Display will show LoAd 0. Remove all weights from the pan and wait until display shows next step. Display appears LoAd 1. Put the first weight on the pan and wait for next step. Display appears LoAd 2. Put the second weight on the pan and wait for next step. Display appears LoAd 3. Put a weight of full capacity on the pan. Short time later the balance automatically returns to weighing mode. During that time remove the weights. Note: Calibration weights of LoAd1, LoAd2 and LoAd3 must be integer. Example: PFB 6000-1: LoAd 1: e.g. 1kg, 2kg or 3kg LoAd 2: e.g. 3kg, 4kg or 5kg LoAd 3: maximum weight (6kg)

P2 CAL	Calibration procedure: The display appears "UnLoAd". Remove all weights from the pan and wait for stabilization. When display „**LoAd**“ appears, put the necessary calibration weight on the center of the weighing plate. PFB 120-3: 100g (F1) PFB 200-3: 200g (F1) PFB 1200-2: 1000g (F1) PFB 2000-2: 2000g (F1) PFB 6K0.05: 5000g (F1) PFB 6000-1: 5000g (F1) Calibration will be carried out automatically after dead stop control. „**PASS**“ appears, the calibration process has been finished successfully. Take away calibration weight.
P3 Cnt	Display will show the internal counts, e.g. 74130. Press  key to escape.
P4 AZn	Autozero function: Options: oFF, 0.5d, 1d, 2d, 4d
P5 GrA	Gravity adjustment: When the balance is first used or has been moved to different place, it should be calibrated using a calibration weight. When a calibration weight is not available, the correction of the gravity factor will compensate the balance. Change the gravity factor of the balance to the value of the area where it will be used. For example: Local latitude= 9.85, latitude of calibrated place= 9.75 Input new gravity factor (9,85 **:** 9,75). In this case 1.01025. Note: After you do the calibration “P2 CAL”, the gravity factor will reset to 1.00000
P6 CAP	Set scale capacity For example PFB 6000-1= 6000 G Note: This parameter is not available at all software versions.

7 Error messages

Err 3	Calibration error	• Incorrect calibration weight • Put on correct calibration weight
Err 4	Zero range exceeded/ Initial zero error (> 4% of maximum capacity)	• Remove load and press  to reset balance to zero. • Improper calibration of the balance • Load cell damaged • Electronics damaged
Err 5	Keyboard error	• Inadmissible input
Err 6	A/D count outside range when turning on the balance	• Weighing pan not installed • Load cell damaged • Electronics damaged
Err 7	Percentage setting error	• 0.01% must be > 0.5d
Err 8	External calibration weight error	• Difference of calibration weight to stored value more than 4%

8 Trouble shooting

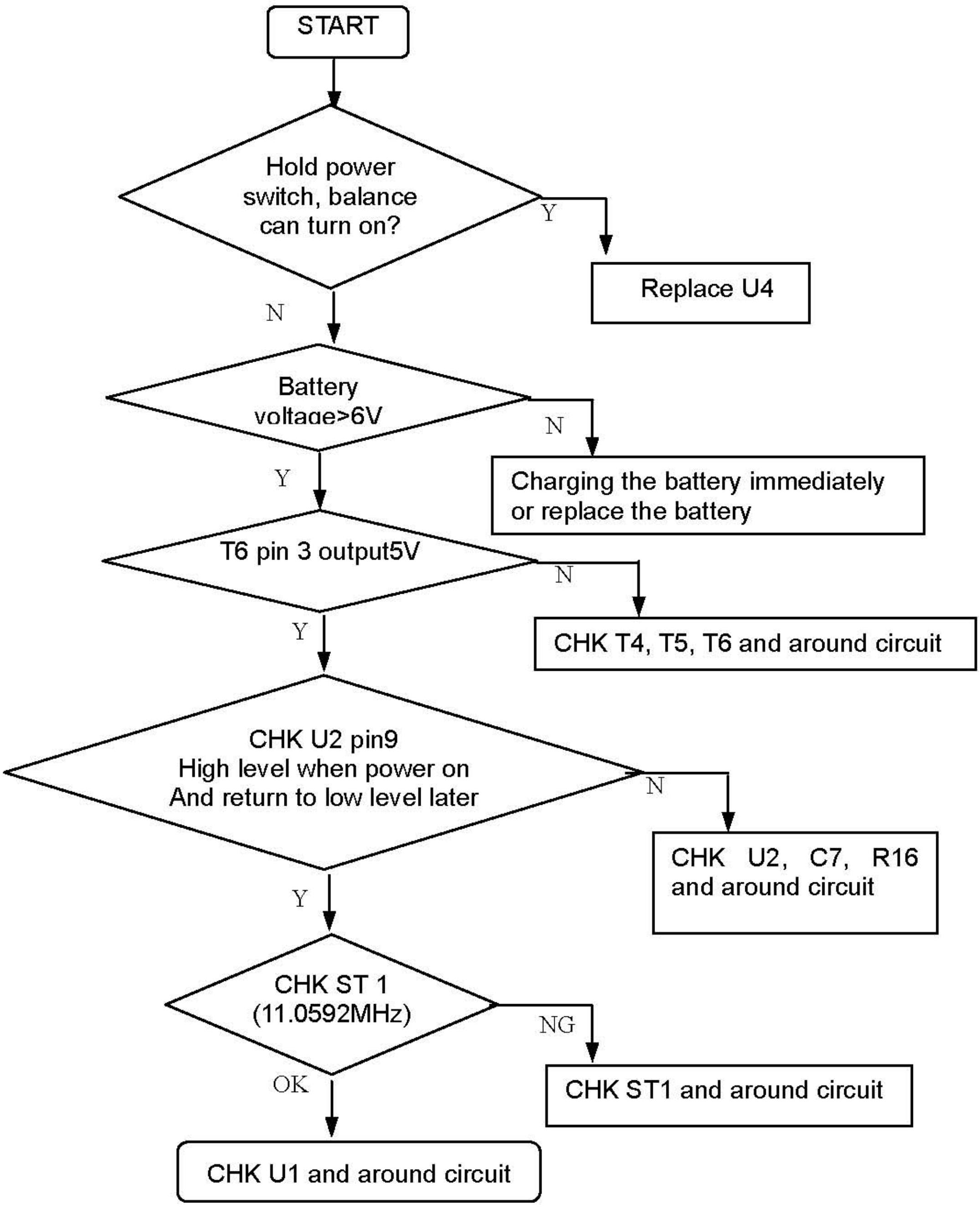
Problem	Possible cause
Display is blank Unit does not turn on	Power supply faulty Internal battery not charged Electronic defective
Unit turns on but the display appears an error message or stays on self test	Pan not installed correctly Unstable readout Load cell damaged
Balance shows **OL** or **----**	Maximum capacity exceeded Load cell damaged Power supply faulty
Balance shows **----** or **NULL**	Pan has been removed Pan support not installed correctly Power supply faulty Load cell damaged
Unstable readout	Air drafts or vibration or unstable table Pan rubbing against case or not installed correctly Sample is moving (animal weighing) Load cell damaged Power supply faulty
Balance shows wrong weight	Calibration error Linearity error Balance have not been leveled Selected wrong weighing unit
Cannot use full capacity	Overload stopper adjusted incorrectly Transportation lock not removed Electronic problem (A/D) Set-up of parameters incorrectly Load cell damaged
Linearity error	Wrong linearity adjustment Load cell damaged
Off-center load error	Overload stopper adjusted incorrectly Load cell damaged
Battery will not charge	Power supply faulty Charging circuit board failure Battery defective

9 Countermeasures for each trouble

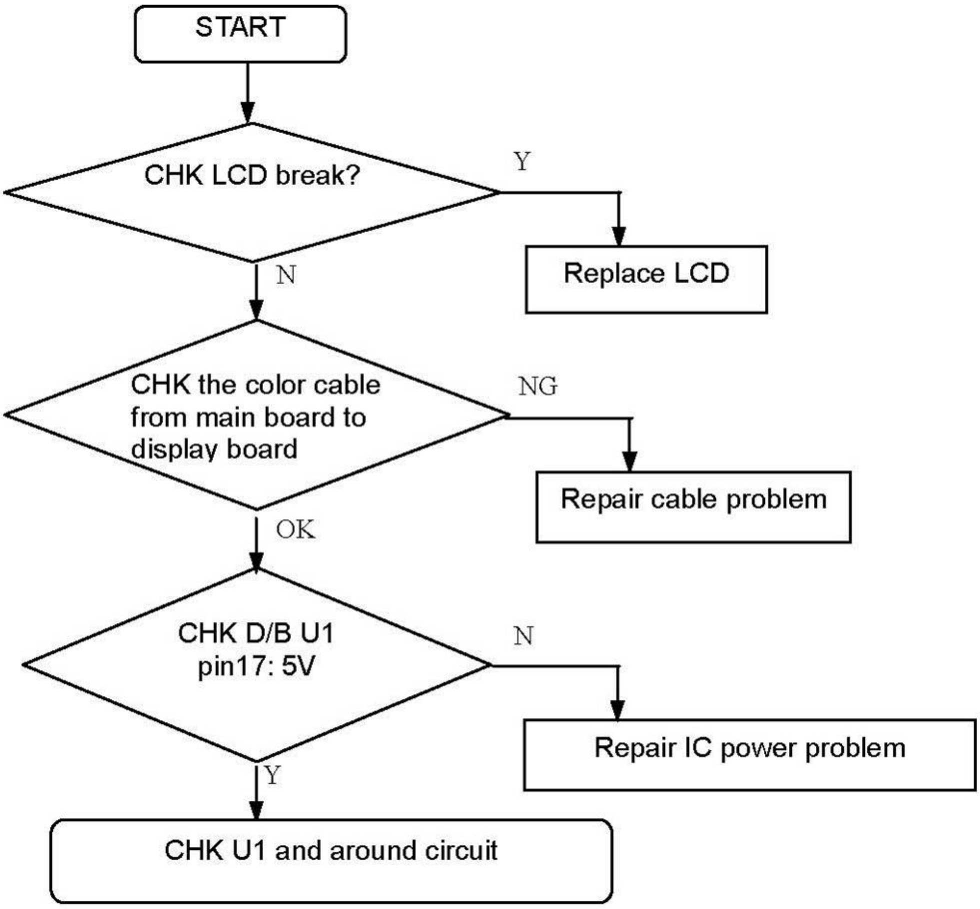
Some abbreviations:

M/B means main board
D/B means display board
CHK means check

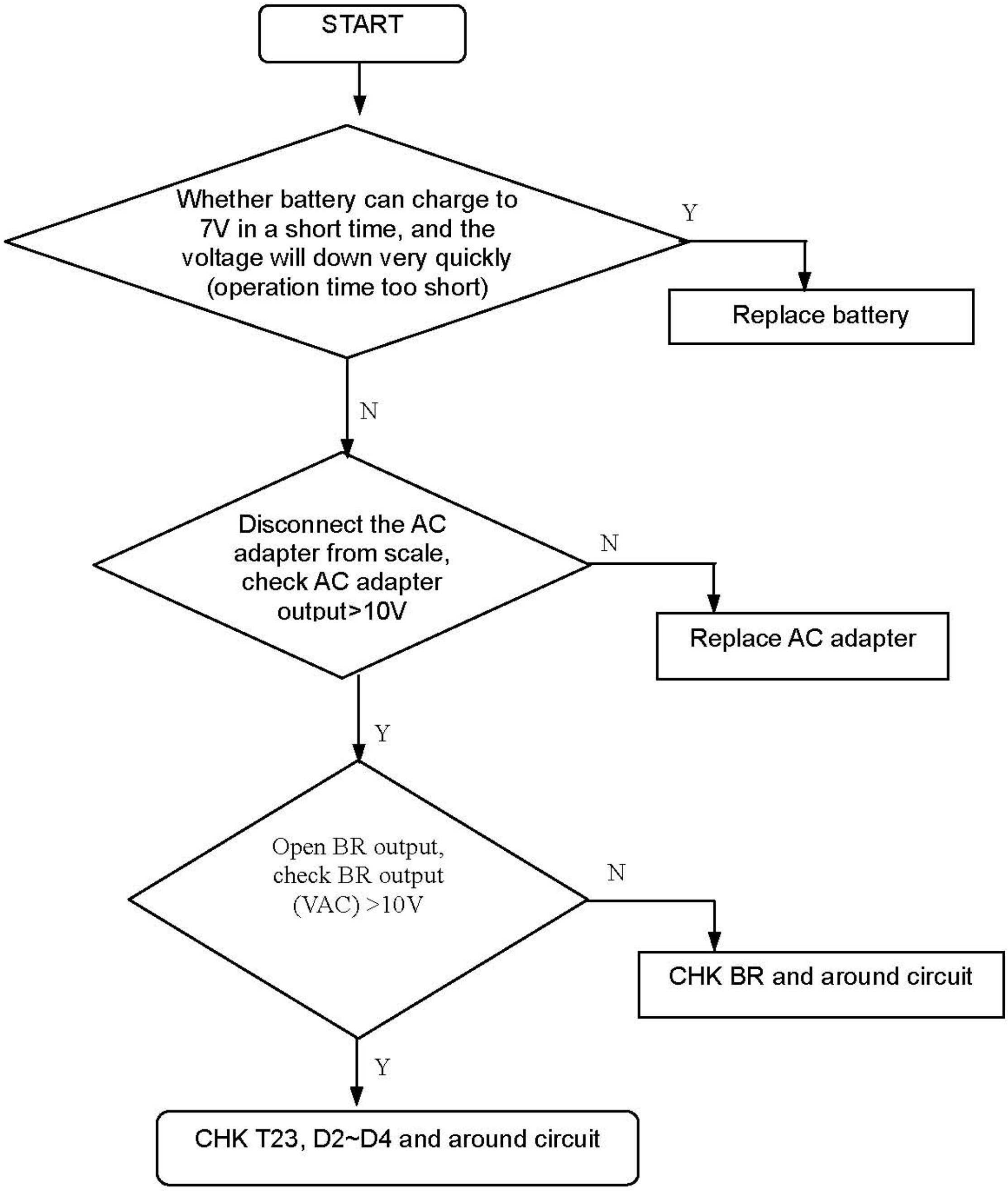
A - No function



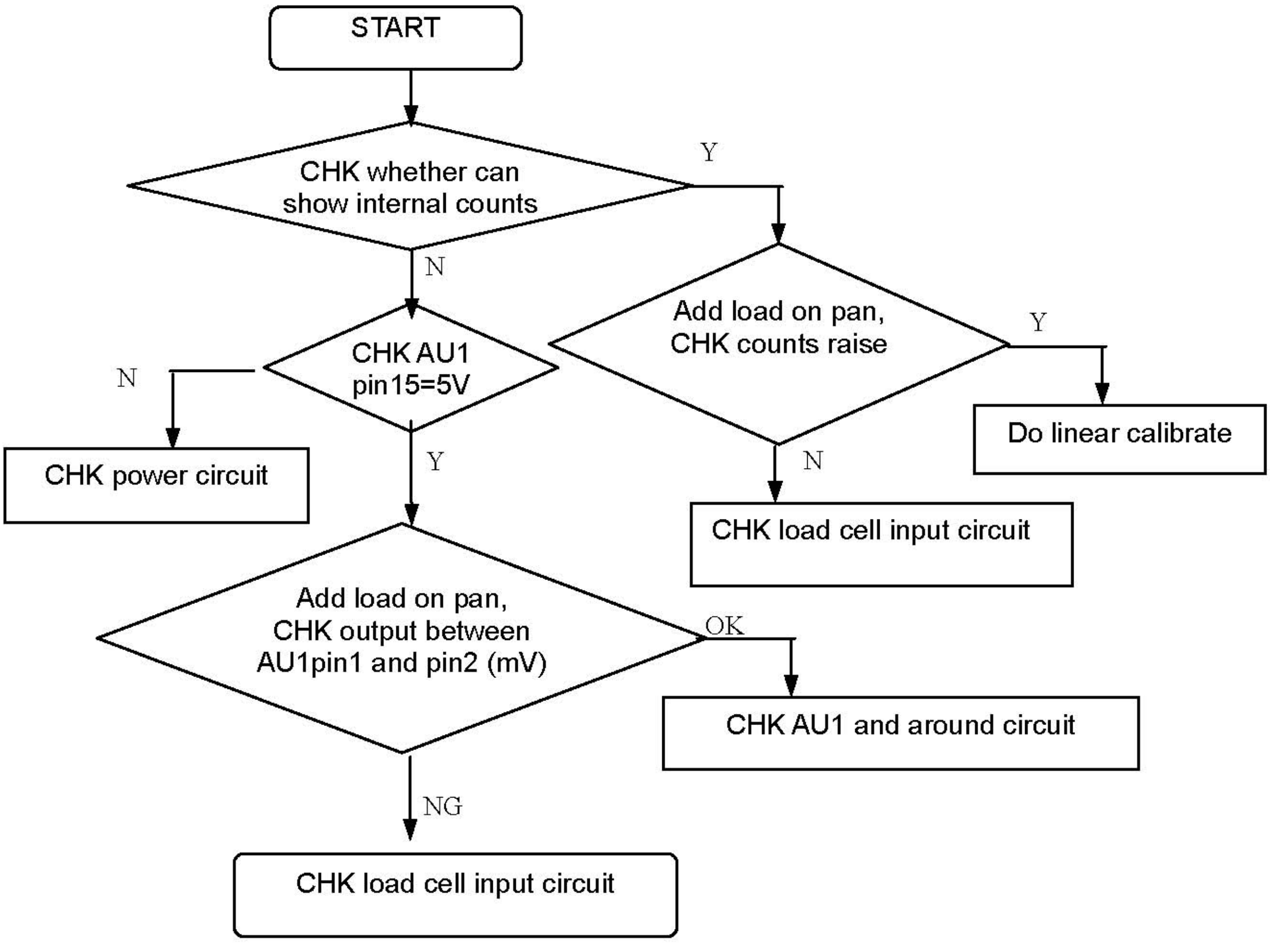
B – No display readout / display is blank



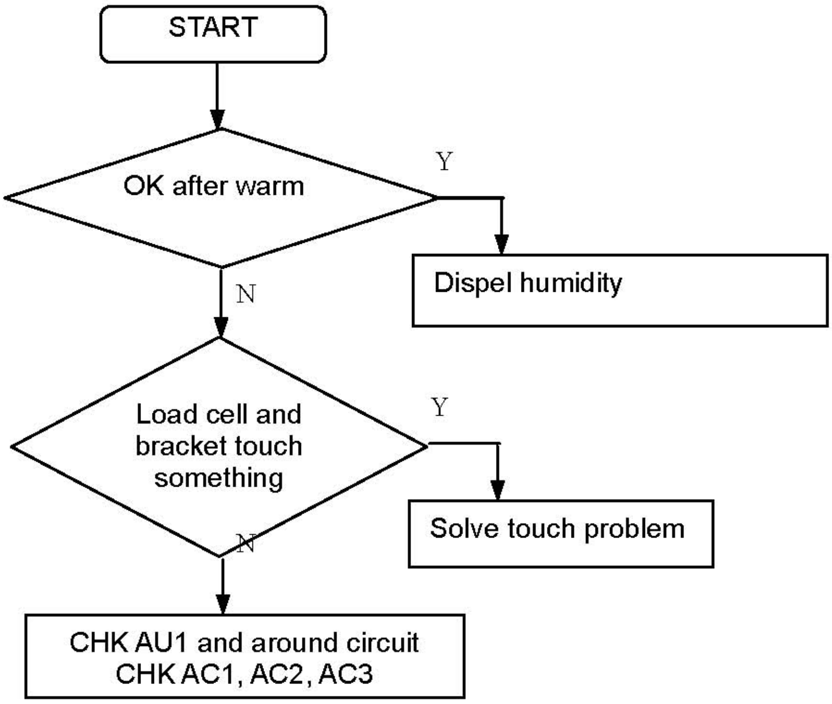
C – Battery will not charge



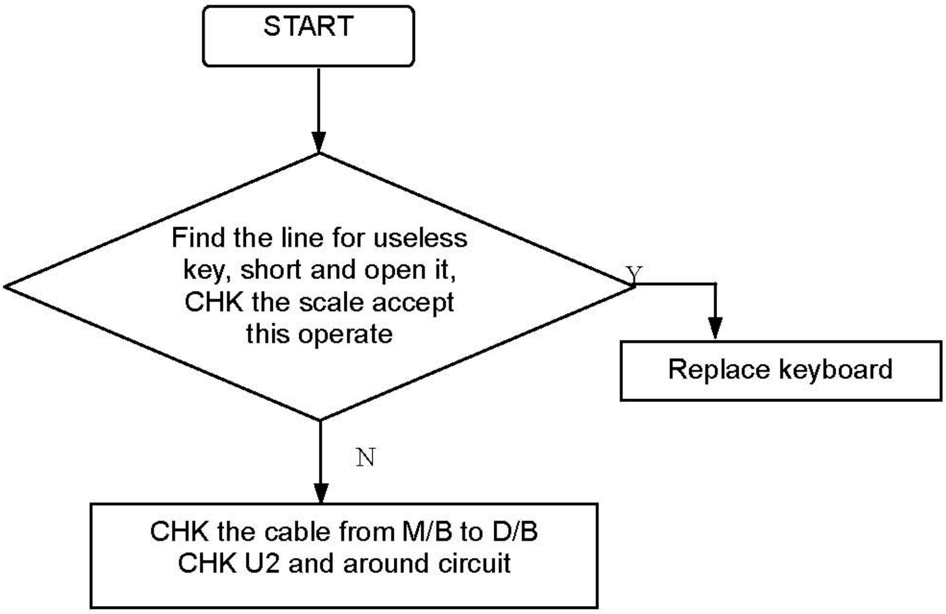
D – No weighing value



E – Unstable reading

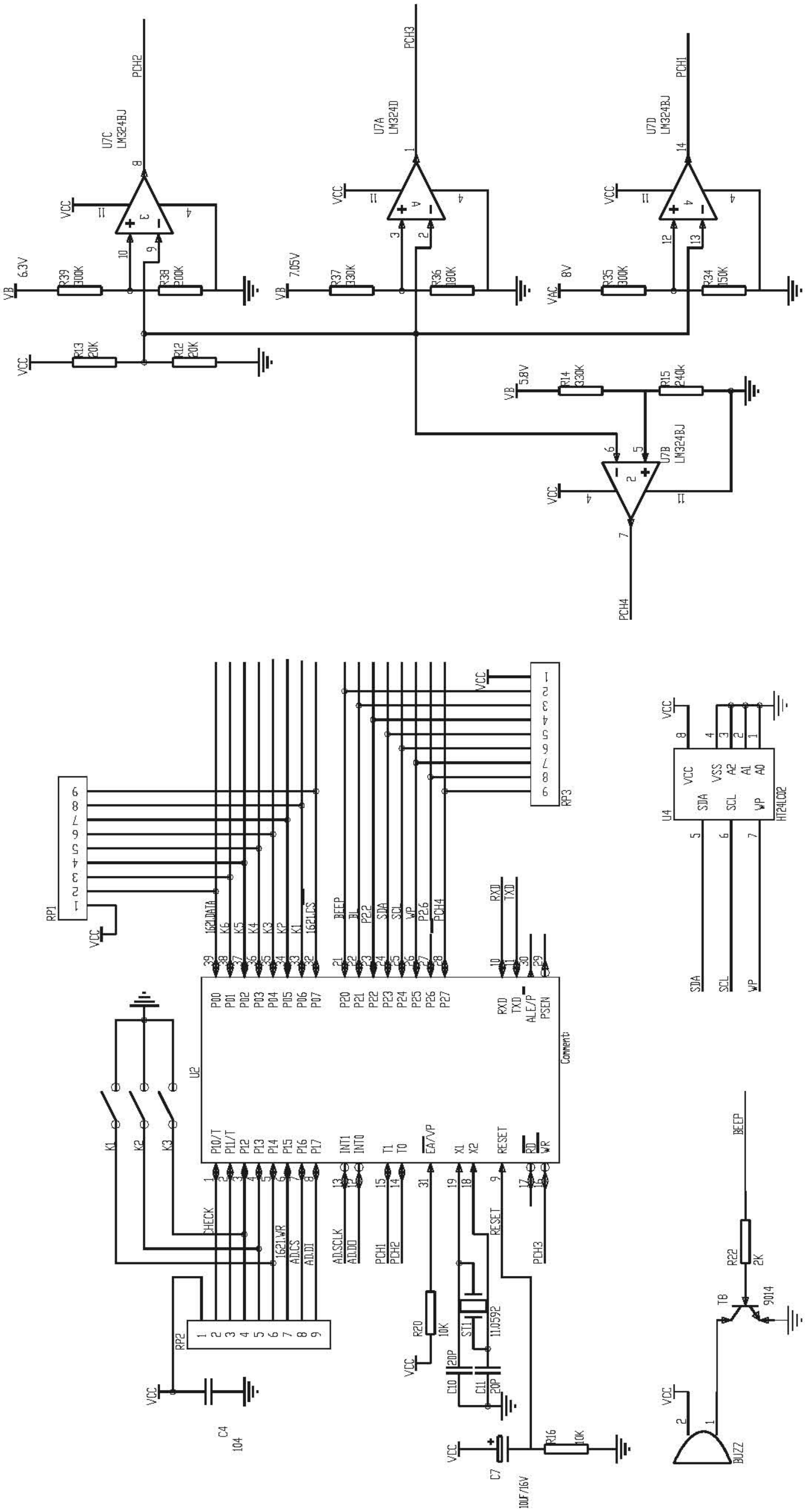


F – Keyboard without function

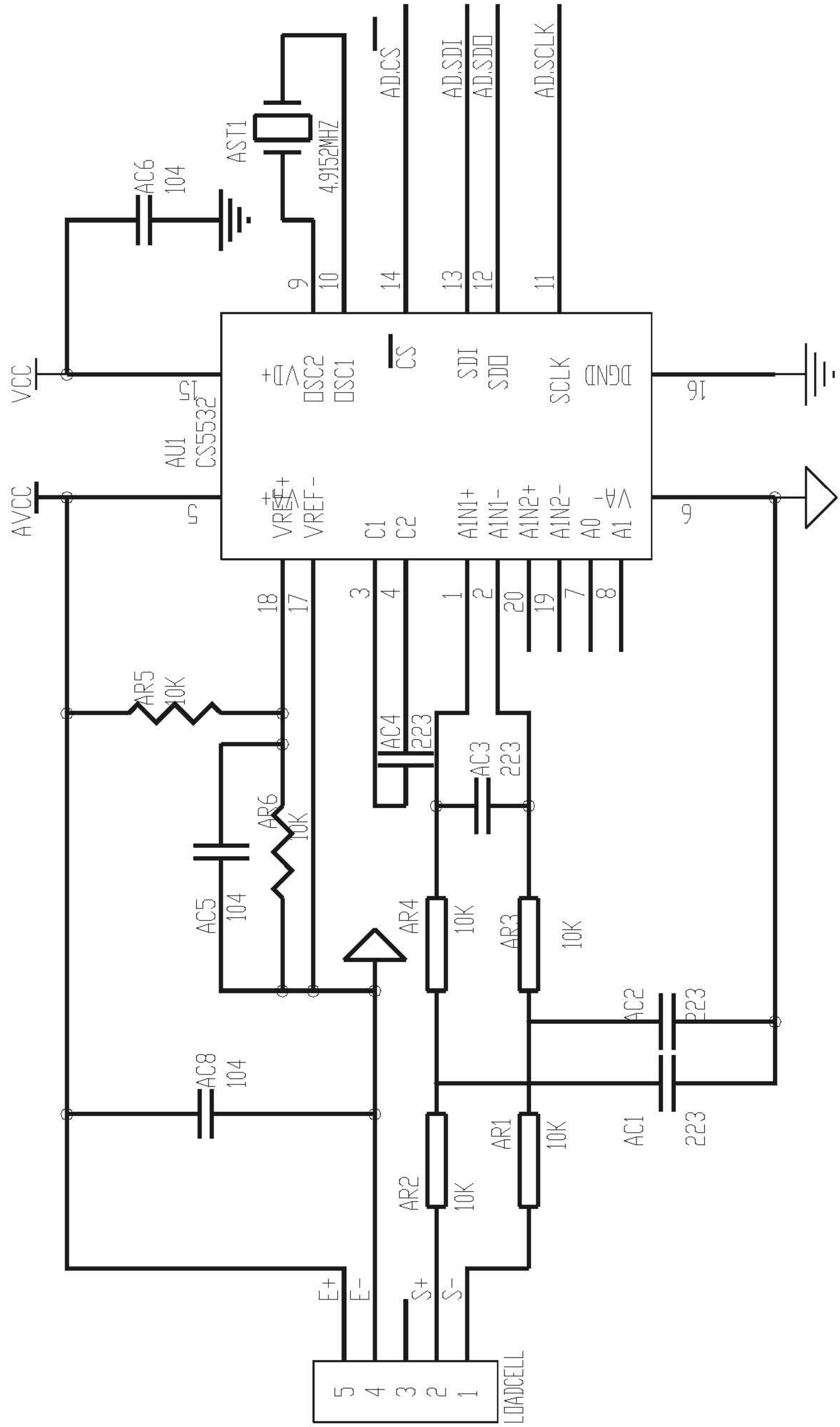


10 Schematics

Main board

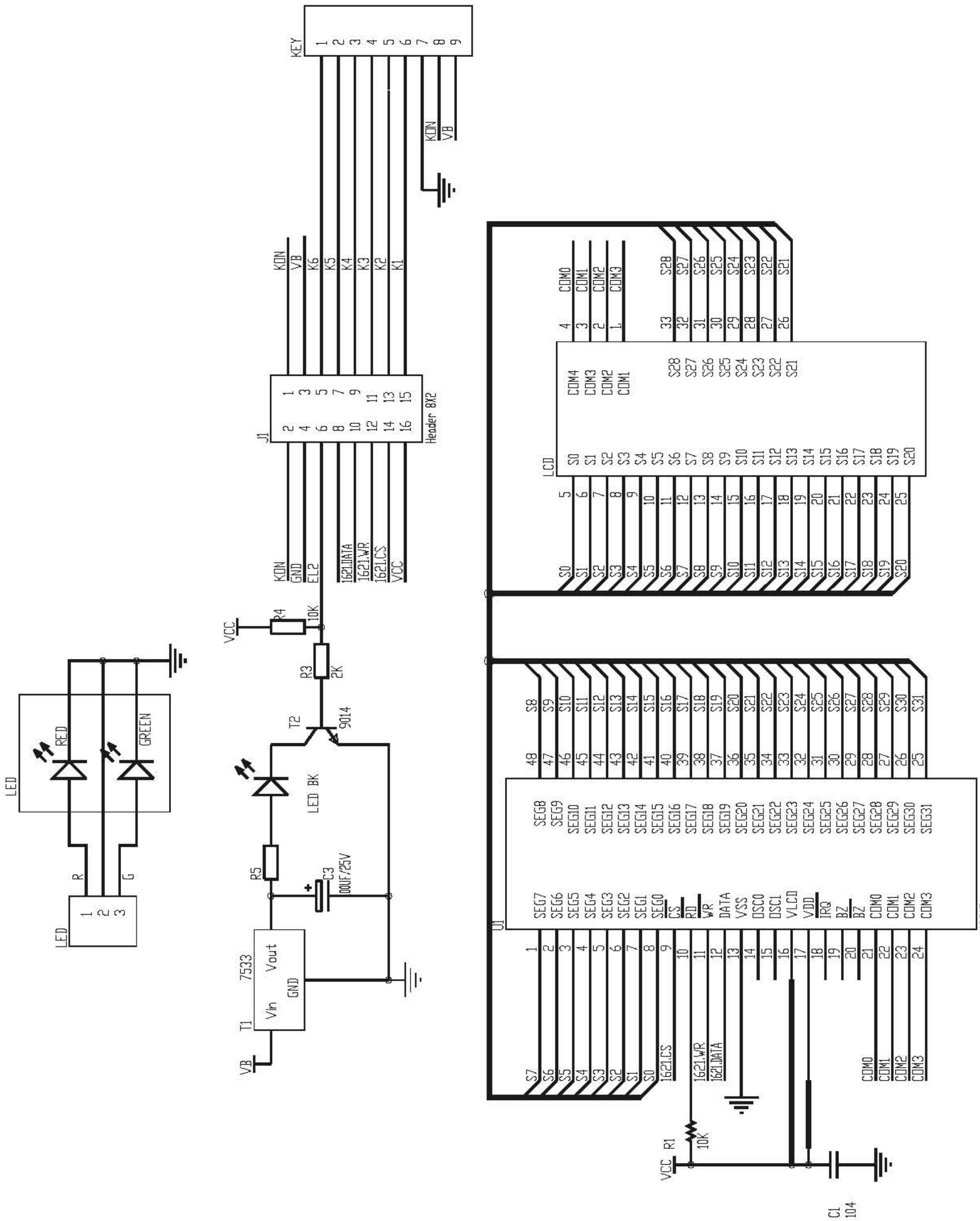


ADC

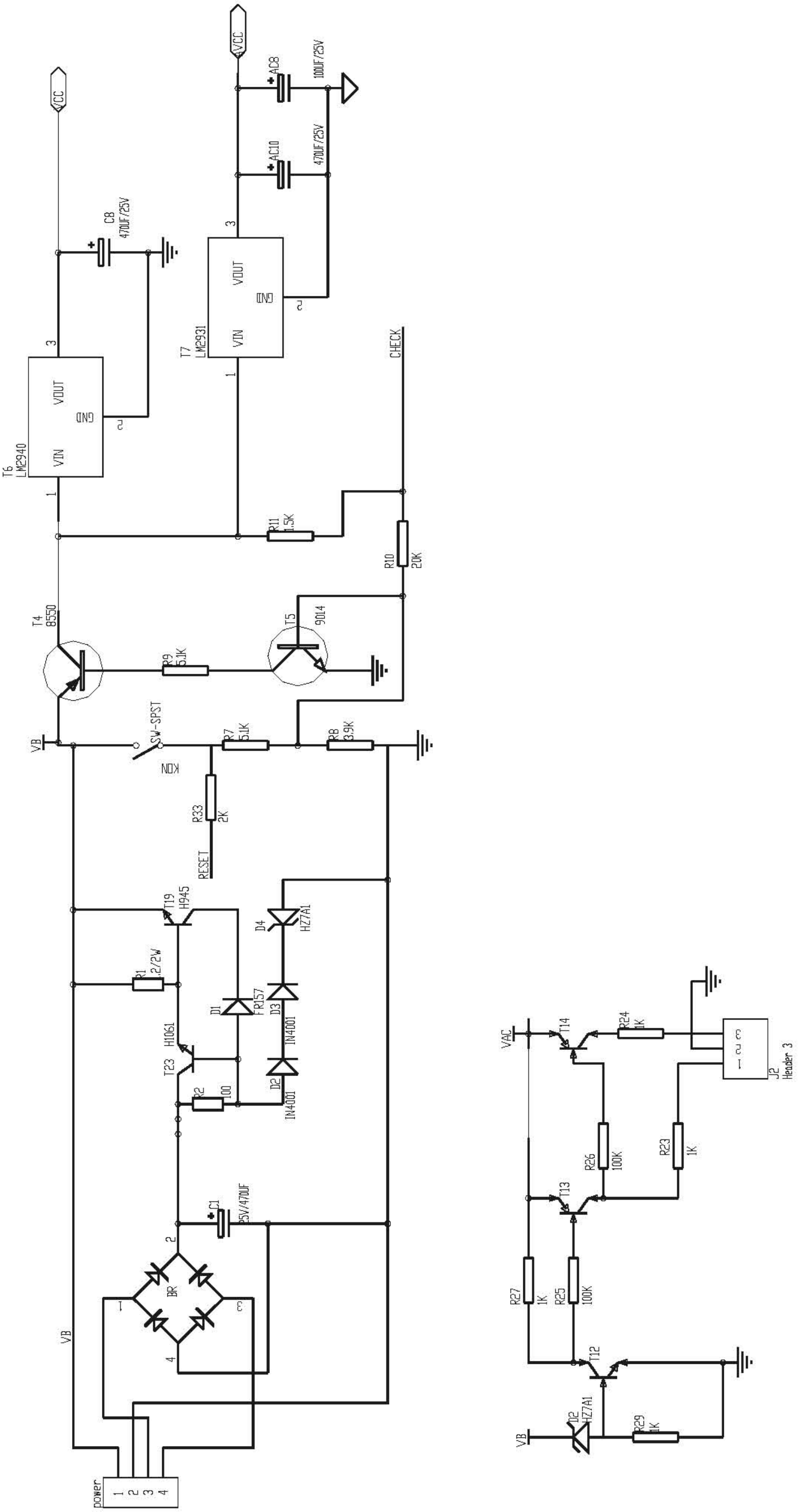


VCC
AVCC
AC6
104
AST1
4.9152MHZ
AD.CS
AD.SDI
AD.SDO
AD.SCLK
AU1
CS5532
V+D
OSC2
OSC1
CS
SDI
SDO
SCLK
DGND
VREF+
VREF-
C1
C2
A1N1+
A1N1-
A1N2+
A1N2-
A0
A1
VA-
AR5
10K
AR6
10K
AC5
104
AC4
223
AC3
223
AR4
10K
AR3
10K
AC2
223
AC1
223
AC8
104
AR2
10K
AR1
10K
E+
E-
S+
S-
LOADCELL

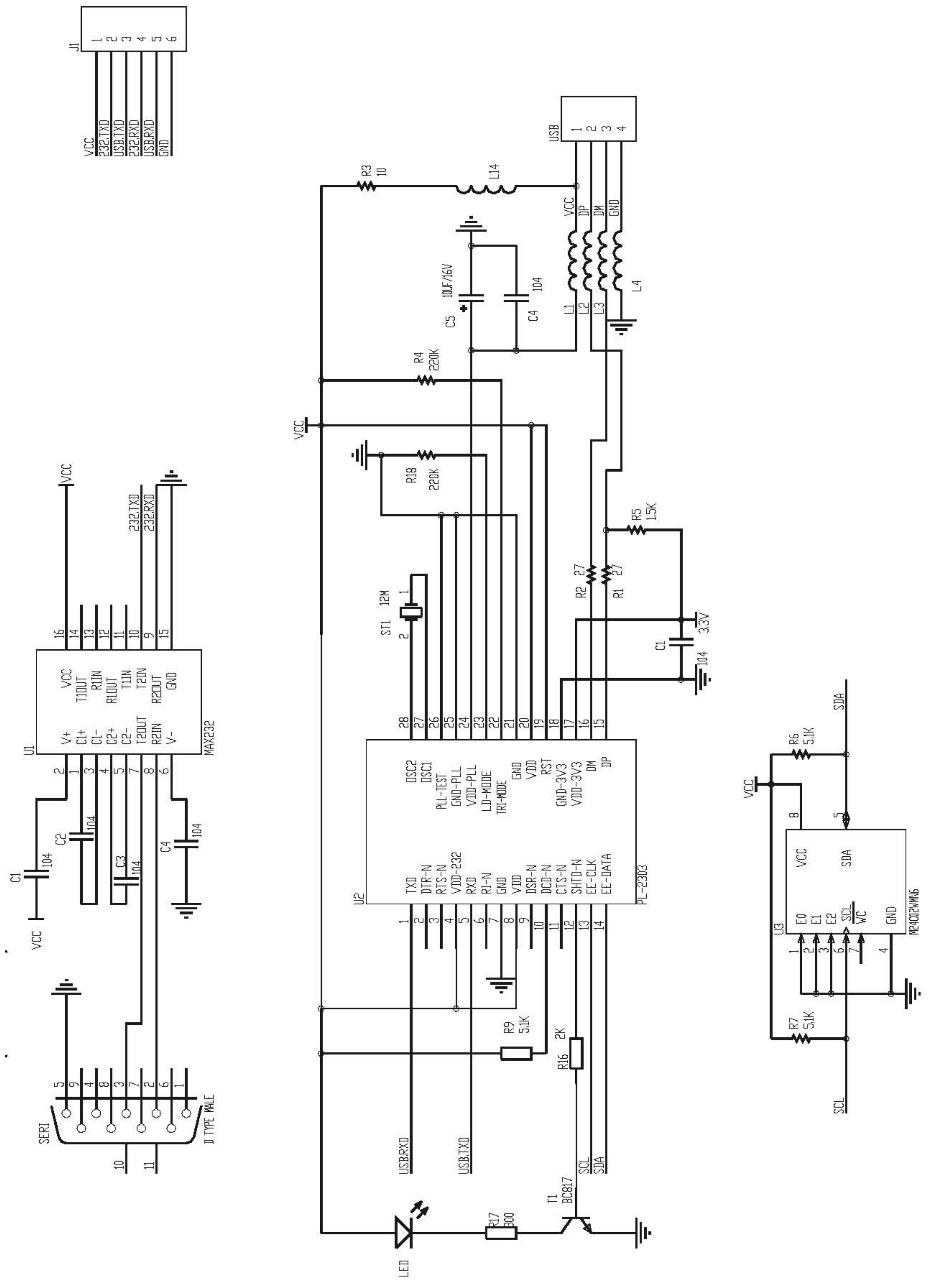
Display board



Power supply

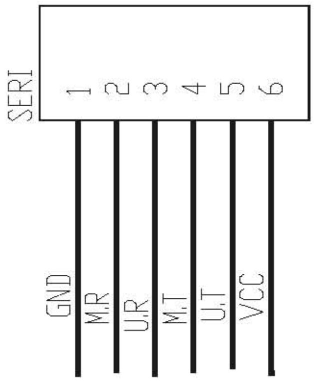


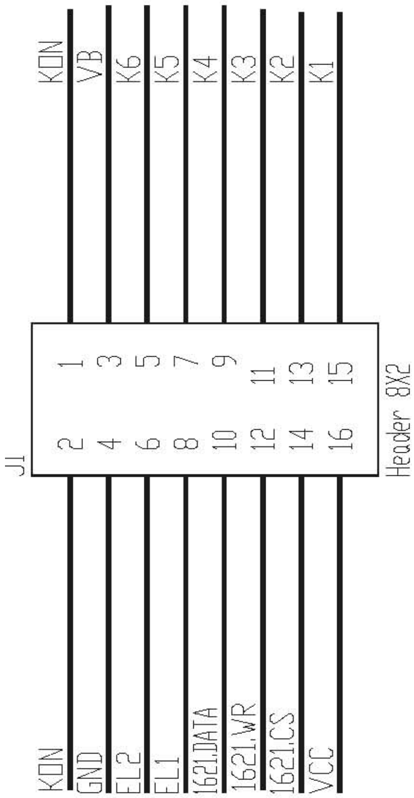
Interface

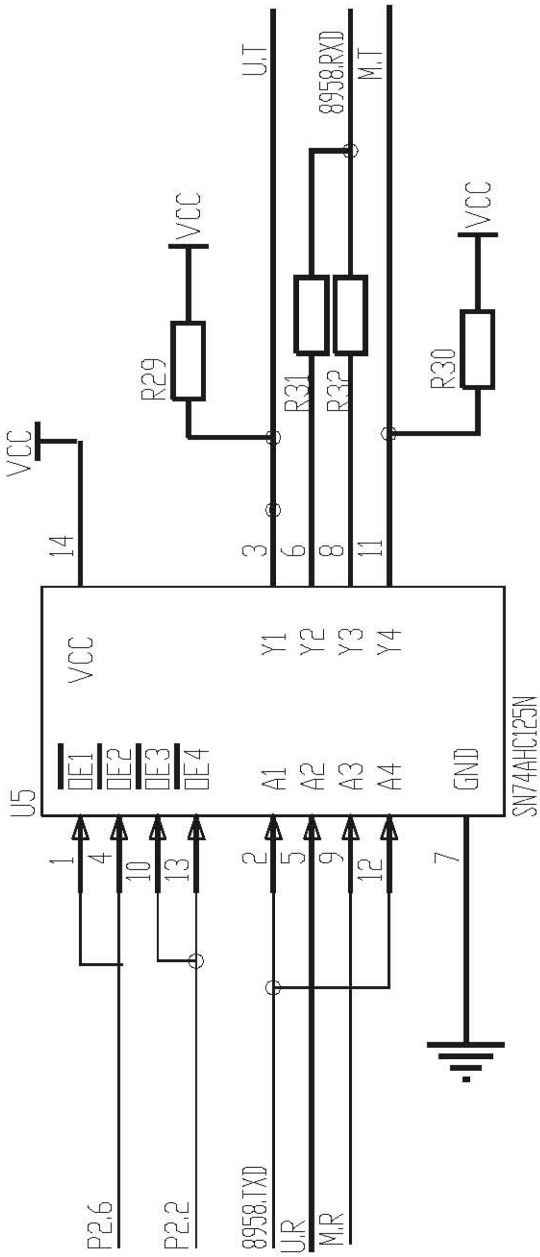


J1
VCC
232.TXD
USB.TXD
232.RXD
USB.RXD
GND
USB
MAX232
PL-2303
M24C02WMN6
LED
SCL
SDA

Other

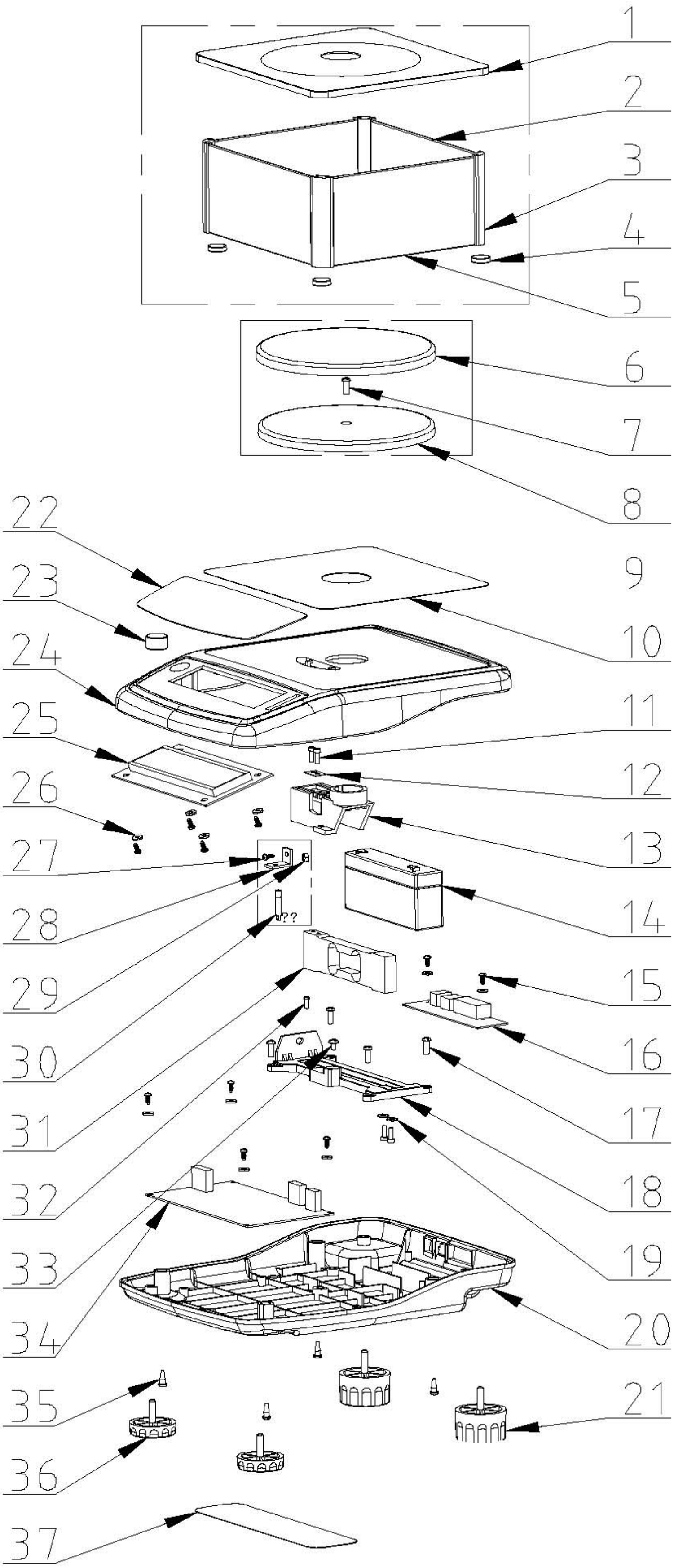

SERI
1 2 3 4 5 6
GND
M.R
U.R
M.T
U.T
VCC


J1
Header 8X2
KON
VB
K6
K5
K4
K3
K2
K1
GND
EL2
EL1
1621.DATA
1621.WR
1621.CS
VCC


U5
SN74AHC125N
VCC
OE1
OE2
OE3
OE4
A1
A2
A3
A4
Y1
Y2
Y3
Y4
GND
R29
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P2.2
8958.TXD
U.R
M.R

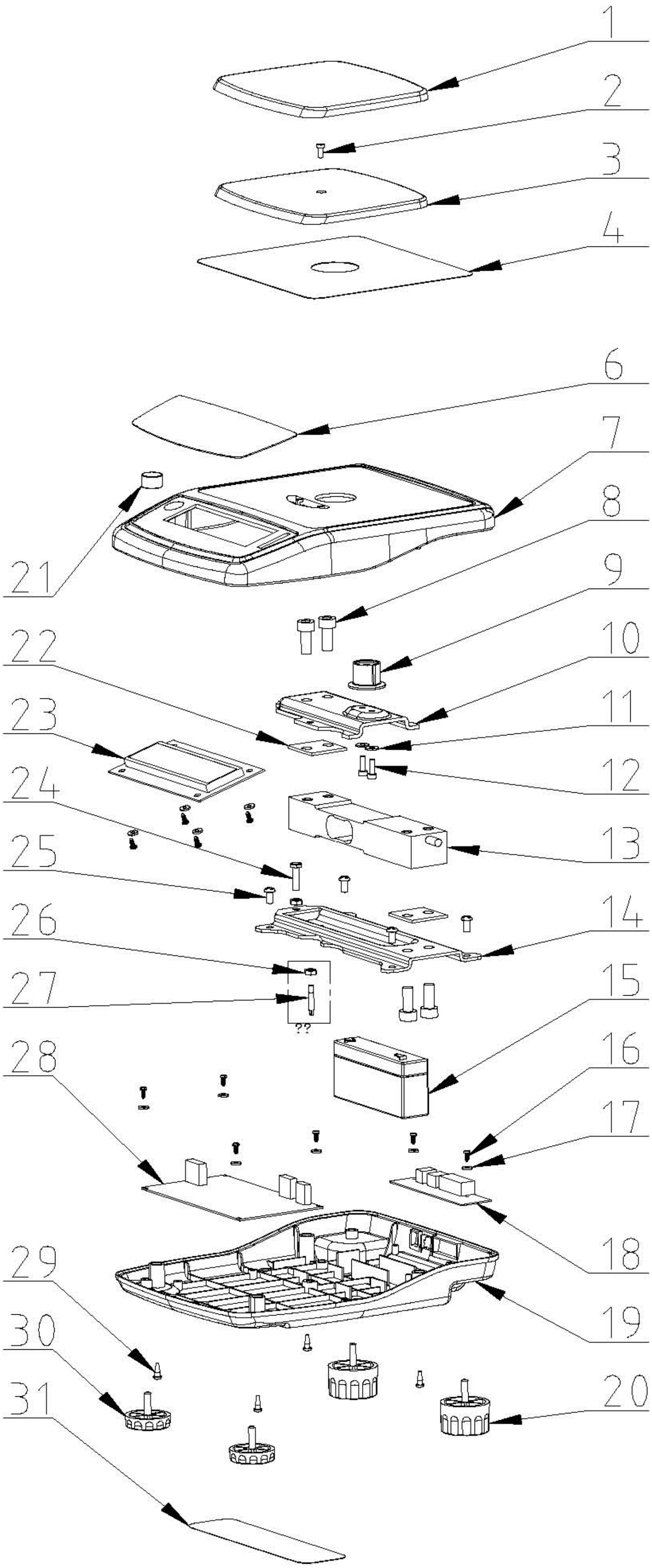
11 Exploded drawing

11.1 Capacity 120g~3000g



No	Description	Qty	Material	Spec
1	wind shield top cover	1	AL	
2	toughened glass 1	2	glass	152.5x80x3t
3	pole for glass	4	AL	
4	Round rubber spacer	4		
5	toughened glass 2	2	glass	138.5x80x3t
6	SST pan	1	SUS304	Ø 80/120
7	"+" screw	1	S18C	M4x12, 6.8
8	plastic pan	1	ABS	Ø 80/120
10	SST cover	1	SUS304	0.5t
11	internal hexagon screw	4		M3x12,8.8
12	load cell shim	2	SUS304	16x13x1t
13	load cell upper bracket	1	ABS	
14	battery	1	lead acid	6v/1.2Ah
15	self thread screw	10	S18C	3x10, 6.8
16	interface PCBA	1		RS232/USB
17	"+" screw	4	S18C	M4x10, 6.8
18	load cell lower bracket	1	AL	
19	washer	2		M3
20	bottom cover	1	ABS	
21	foot 2	2	ABS	
22	key panel	1	PC	
23	level bubble	1		14.7mm
24	top cover	1	ABS	
25	dislay PCBA	1		
26	insulative washer	10	EDPM	8x3.1x1.5t
27	"+" screw	1	S18C	4x12, optional
28	L type below weighing screw	1	SUS304	Optional
29	Hexagon nut	1		M4, optional
30	Below weighing pole	1		optional
31	load cell	1	AL	SPL
32	"+" screw	1	S18C	M3x6,
33	Screw (big head)	1	SUS304	M4x10
34	main PCBA	1		
35	"+" screw	4	S18C	4x12,8.8
36	foot 1	2	ABS	
37	Name plate	1		

11.2 Capacity 6000g



No	Description	Qty	Material	Spec
1	SST pan	1	SUS304	145x155
2	"+" screw	1	S18C	M4x12, 6.8
3	plastic pan	1	ABS	145x155
4	SST cover	1	SUS304	0.5t
6	key panel	1	PC	
7	top cover	1	ABS	
8	internal hexagon screw	4		M6x20
9	Pan support	1	Al	
10	load cell upper bracket	1	Al	
11	washer	2		M3
12	Internal Hexagon screw	2		M3x12
13	load cell	1	AL	PW6K
14	load cell lower bracket	1	AL	
15	battery	1	lead acid	6v/1.2Ah
16	self thread screw	10	S18C	3x10, 6.8
17	insulative washer	10	EDPM	8x3.1x1.5t
18	interface PCBA	1		RS232/USB
19	bottom cover	1	ABS	
20	foot 2	2	ABS	
21	level bubble	1		14.7mm
22	load cell shim	2	SUS304	16x13x1t
23	dislay PCBA	1		
24	"+" screw	4	S18C	M4x20
25	Hexagon Screw	1	SUS304	M4x10
26	Hexagon nut	2		M4, optional
27	Below weighing pole	1		optional
28	main PCBA	1		
29	"+" self thread screw	4	S18C	4x12
30	foot 1	2	ABS	
31	Name plate	1		

12 LCD display – numeric and alphabetic characters

0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9
A	B	C	D	E	F	G	H	I	J
A	b	C	d	E	F	G	H	ı	J
K	L	M	N	O	P	Q	R	S	T
⊢	L	n̄	n	o	P	ō	r	S	t
U	V	W	X	Y	Z				
U	u	ū	≡	y	Z				